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ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 26th May, 1851,

BY CAPT. W. H. SMYTH, R.N., K.S.F., D.C.L., &c.
PRESIDENT.

GENTLEMEN,—When I last year had the honour of addressing you from this chair, I ventured to congratulate you upon the elements of stability which I then perceived in the Society, hinting that the depression into which your financial affairs had fallen might be looked for in temporary causes; and the Report which you have just heard will show that we are fairly afloat again. This most desirable state has been owing to your own harmony, to the continued care of your Council, and to the diligence of Dr. Norton Shaw, who, from the unavoidable absence of one of your honorary secretaries, and the melancholy indisposition of the other, has had nearly the whole of the secretarial duties to perform. On that occasion I also alluded to our strong expectation of aid from Government, the utility of our association to the public interests having been substantially laid before them. But I regret to say that as yet we are unconsidered; and were it not for the discriminating kindness of the Principal, the Officers, and the Council of King's College, in admitting us to the use of their apartments, we should have been utterly unable to accommodate the increasing number of persons who attend our evening meetings. The marked favour, however, thus extended to us, is but for the present session; and it will be apparent that for future views the Fellows must cheerfully unite with the President and Council in working as effectively as they possibly can. A Geographical Society might certainly, and with propriety, have found favour in the eye of the Government of a great maritime and commercial country; but it is our part to deserve success by eschewing despondency. I, therefore, call upon you all, and severally, to stand by your colours,—

> "True as the dial to the sun,
> Although it be not shin'd upon."

OBITUARY.

Still while feelingly conscious that a zealous spirit has recently been excited, which is already actually reaping its reward, it is with sincere concern that I observe how active has been the hand of death in our ranks; for, since the last Anniversary Meeting of this Society, the grave has closed over no fewer than twelve of our Fellows and three of our Honorary Associates. The deceased are:—

Bexley, Lord.
Du Bois de Montpéreux, M.
Du Cane, Captain, R.N.
Harrison, Thomas, Esq.
Lapie, Colonel.
Mawbey, Lieut.-General.
Northampton, Marquis of.
Nugent, Lord.
Peel, Sir Robert.
Ross, Major-Gen. Sir Patrick.
Shadwell, Rt. Hon. Sir Lancelot.
Stanley, Lord, of Alderley.
Stanley, Capt. Owen, R.N.
Stannus, Major-General.
Wahlenberg, Professor.

Lord Bexley, though known to most of you by a gentle and amiable demeanour, played no slight nor unimportant part in the great political arena of his day, having been Chancellor of the Exchequer during a period of great embarrassment to that department. But in Sir Robert Peel there has fallen one who may be justly deemed a leader of the age—a man whose extraordinary abilities have exerted a vast and acknowledged influence over all branches of public affairs, and yet possessed of a mind warmed to the pursuits of philosophy and the fine arts. But my mention of this distinguished statesman must necessarily be confined to his connexion with the scientific bodies in which he took an active and effective interest. He considered that the notice of Government and substantial patronage ought to be extended to the advancement of human knowledge, and illustrated his opinions by acts. Hence his exertions in the cause of the Greenwich Observatory, the British Museum, the Fine Arts' Commission, and other public institutions; and hence his becoming the active trustee of the Ratcliffe Observatory at Oxford, which owed its resuscitation to him and the intelligent M. J. Johnson, who so ably presides over it. Sir Robert was one of the first to suggest the acquisition of the powerful and costly heliometer at that place; and it was but a few days before he met the lamentable casualty which deprived him of life, that I had the honour of acquainting him with the excellence of the instrument, as proved in measuring the double star γ Virginis. He was one of the very earliest members of this Society; and he took an earnest zeal in establishing the geological branch of the Ordnance Survey of Great Britain, now so efficiently conducted by Sir Henry De la Beche, a distinguished member of your Society.

Lord Nugent was one of those who joined in the first formation of this Society, and, though not himself a practical geographer, was useful in furthering the science, especially while filling the post of Lord High Commissioner of the Ionian Islands. His Lordship was equally well known in the fields of politics and literature, and in private life was remarkable for his uniform suavity of disposition. He died on the 26th of last November, at Lilies, near Aylesbury, of the library of which he had published Legends. On the same day we also lost Lieutenant-General Sebright Mawbey, an officer who had served with distinction from the year 1787 to 1815; and during the time he was Assistant Quartermaster-General to the army in Corsica in 1795, was very diligent in collecting plans and maps of that island.

Spencer Joshua Alwyne Compton, Marquis of Northampton, was born in January, 1790, and educated at Trinity College, Cambridge. He became President of the Royal Society in 1838, on the retirement of H.R.H. the Duke of Sussex, and filled that important post till November, 1848, when he resigned it to the Earl of Rosse. He very unexpectedly expired on the 16th of last January, at his seat of Castle Ashby, a few days only after the death of his son-in-law Lord Alford, an event by which he had been deeply afflicted. The noble Lord was a man of varied acquirements, being an accomplished scholar, a proficient in art and literature, a good antiquary, a linguist, a practical geologist, and, without being strictly scientific, an ardent lover of the transcendental branches of human inquiry, which he promoted by every means in his power. Perhaps most of us now present can bear personal testimony to the unvarying and unaffected benevolence of his disposition, the habitual cheerfulness of his temper, and the utter absence from his mind of anything like implacability. Indeed, his expression in a case of my own is well worthy of note among associated bodies:—"Well, Captain Smyth," said he, "I thought you were wrong, and perhaps may think so still; but as your party carried it, my present duty is to do what I can to forward the measure."

In Major-General Sir Patrick Ross the Society has lost a warm and useful friend; for, both in the Mediterranean and in the West Indies, he encouraged directly every inquiry into chorographical details; and during the time he held the post of Resident at Zante, all travellers into Greece who visited that island were furnished with much useful information; this I can testify from personal experience. Sir Patrick was born in 1778; entered the army in 1794, in the 25th light dragoons; served in various parts of the world till 1821, when he was appointed to the rank of Major-General, and died at St. Helena, on the 28th of last August, being Governor of that island.

Major-General Sir Ephraim Gerish Stannus, C.B., was a gallant soldier of the Bombay army, which service he entered in 1799. At his death he was Governor of the East India Company's Military College at Addiscombe, of which establishment he was a most efficient ruler; and his death is deeply lamented.

The Right Honourable Sir Lancelot Shadwell, Vice-Chancellor of England, will be recollected by some of my auditors, not only for his eminence in the law, and his great general qualifications, but also for his excellent temper, kind disposition, and unvarying gentlemanly behaviour.

The venerable and highly-esteemed Lord Stanley, of Alderley, died in his eighty-fourth year, within a short time of his only brother, the late Bishop of Norwich, whose death we so recently deplored. At the age of twenty-three Lord Stanley freighted a brig of 130 tons, in which, with Mr. Wright as surgeon and botanist, Mr. Baine as mathematician and draughtsman, and Mr. Benners as secretary, he sailed from Leith in May, 1789, to explore the mountains, springs, and extraordinary natural curiosities of Iceland. Diaries of the journeys and researches in the island are preserved in Alderley Park, and it has long been a matter of regret that they have not been published.

But, geographically speaking, the greatest loss suffered by the Society in the past year is that of Captain Owen Stanley, son of the Bishop, in the thirty-ninth year of his age. After passing through the Royal Naval College, this officer embarked on board the 'Druid' frigate, and, having served his noviciate in several ships, was appointed to the 'Adventure,' Captain P. P. King, at Valparaiso, to assist in the exploration of the Straits of Magellan. This was his first initiation as a nautical surveyor; and, in consequence of being placed under the tuition of some of my former officers, he was wont good-humouredly to claim scientific relationship with myself. Having been promoted to the rank of Lieutenant, he was appointed to assist his friend, the present Captain Graves, in the Mediterranean, where he examined the Gulf of Lepanto in a small boat, which he afterwards hauled over the Isthmus of Corinth, and rejoined his ship at Vourlah, after an absence of eighty-four days. In 1836 he was appointed to the 'Terror,' Captain Sir George Back, on her expedition to the Polar regions in search of Sir John Ross; and on this perilous voyage he had charge of the astronomical and magnetic operations. He was afterwards appointed to the 'Britomart,' in which vessel he aided in forming the colony of Port Essington, and made a track survey of the Arafura Sea, with other work. He became a Captain in September, 1844, and in 1846 was appointed to command the 'Rattlesnake,' a small frigate, expressly fitted for carrying on a survey in the Indian and Australian Seas.

Captain Stanley's hydrographical labours in this ship may be thus summed up:—A survey of Simon's Bay, Cape of Good Hope, on a large scale; plans of Two-fold and Botany Bays, on the E. coast of Australia; a plan of the entrance of Port Jackson, to show how far that harbour is available for the largest class of ships of war; a plan of Port Curtis and the entrance to Moreton Bay; and eleven sheets of the N.E. coast of Australia, from Rockingham Bay to Jervis Island, marking the inner route between the Barrier Reefs and the main land. He also re-examined eight channels through Torres Straits, five of which were previously unknown, and protracted them on a scale of half an inch to the mile of latitude. Of his last work, the Louisiade Archipelago, you are acquainted by the letter so recently read at one of your evening meetings, on which occasion an abstract of the natural history of portions of those countries was given by Mr. Mac Gillivray, who acted as naturalist to the expedition.

Captain Stanley in this charge, as indeed he had always done, devoted his whole time and energy to the fulfilment of the duties entrusted to him by the Lords Commissioners of the Admiralty; and he was fond of scientific pursuits generally, beyond the usual acquirements of an ordinary nautical surveyor—a class of which he proved himself, by his works, so able and distinguished an example. His health had been declining under the fatigues and anxieties attendant upon the arduous labour of surveying in inter-tropical climates, among coral-reefs, strange currents, and many physical and moral evils; and he had complained of illness on his passage from the Louisiade Islands to Port Jackson. At Cape York he first heard of the death of his brother, Captain C. E. Stanley, of the Royal Engineers; and on his arrival in Sydney he was informed of the decease of his father, the tidings of which were conveyed by his former commander, Captain P. P. King. These bereavements preyed upon his mind, and, acting upon a system already much debilitated, had a fatal determination, and brought his valuable life to a sudden close on the 13th of March, 1850. His remains rest in the cemetery at Sydney, wherein he was interred with ceremonials due to his rank, and expressive of the great esteem in which he was held.

Such are the losses we have sustained among our Fellows: nor has the "Fell Serjeant" spared our Honorary list. Among those who have fallen, Colonel Pierre Lapie, of Paris, was a very useful practical geographer, from whose hand has issued a multitude of creditable maps. I had no personal acquaintance or correspondence with him; but, from his public communications and the general merit of his maps, his value as an industrious compiler is manifest. Still it must be acknowledged that he was not always happy in his authorities.

Göran Wahlenberg, Professor in the University of Upsala, and so celebrated by his valuable botanical works, is stated to have spent thirty out of a life of seventy-one years in scientific journeys in Sweden, Norway, Germany, and indeed throughout the different countries of Europe; and the results of these travels were given in a variety of learned publications, among which his well-known Atlas may be specially instanced. He was born in October, 1780, in the Swedish province of Wermeland, and taught at Upsala, a benefit for which he gratefully left to that University his collections and library. He was one of the very first foreigners named as an Associate after the formation of this Society.

Frederic Du Bois de Montpéreux was a native of Switzerland, and in early life was a teacher of the young, the tediousness of which laborious occupation he relieved by a course of sound and scientific studies. About the year 1830, having become the tutor of a young Polish noble, he passed some time in travelling with him over various parts of Germany, Denmark, and Sweden, during which he carefully attended to the geology, antiquities, and ethnology of those countries. Having realized what he deemed a sufficient sum, he set out alone, in the spring of 1832, to explore the Crimea, Caucasus, and the adjacent districts, whence he returned, after four years of difficulty and danger. He was appointed Professor of Archæology in the University of Neufchâtel, near the place of his birth; but his health was undermined by the bodily fatigue and privations he had undergone, and he died under a broken constitution on the 7th of last May, at the age of fifty-two years. He became one of our honorary members in 1844.

OUR OWN "LABOURS."

Agreeably to the form usually observed, I shall now allude to what is designated our own "labours," as applied to the transactions in these apartments. The year now ended has been one of material concern to our interests as a body, inasmuch as the number of persons who attended our Evening Meetings increased so largely that the want of sufficient room for their accommodation was seriously felt. The prospect of aid from the Government still flitted before us; but finding our wants increasing under promise delayed, after gathering the opinions of two or three intelligent friends, I proposed that our Council should apply to the Authorities of King's College for the indulgence which we are now enjoying.

In the mean time our Meetings passed harmoniously and instructively, and were attended by visitors of the highest rank in the intellectual circles. Our library and map establishment have been enriched by numerous presents of importance and value; and our stock of instruments is augmented by the munificent bequest of Mr. Shedden, as stated in your Council's Report. Among other gifts, we should mention the fine series of maps and charts prepared by the Topographical Corps of Vienna for the great Exhibition in Hyde Park, and presented to us by the Austrian Government: nor should the maps of the Royal Society of Northern Antiquaries at Copenhagen, forwarded by Professor Rafn, and the physico-geographical maps executed by the Crown Prince of Sweden, exhibited to us by Count Rosen, be omitted.

The papers read at these Meetings were communicated by Fellows and zealous travellers from all parts of the globe; and as they consequently relate to its various and particular quarters, I shall take the liberty of citing some of them in connexion with those parts in detail. I will therefore at present only express how greatly we have been indebted to the contributors of those documents for the information given, as well as to those gentlemen who favoured us with the results of their actual knowledge—derived either from experience or well-directed inquiry—in the interesting discussions which followed the several readings. These evenings have indeed greatly gratified me, in the obvious proof they have afforded of our possessing steady friends who take a permanent concern in the advancement of the objects and in the continued prosperity of the Society.

Those communications which relate to the important consideration of the instruments essentially requisite for scientific travellers, are of paramount interest to a Society of Geographers: and in this light we may class two which were received in the past year; since, however open to practical objections, they are very likely to lead to useful investigation, and consequent valuable results in the instrumental means of measuring the heights of mountains. This has been effected with great exactitude by means of the simple yet powerful Torricellian Tube; and the only objection ever yet made to its use, has been its difficulty of transport among abrupt heights. In probing the revealments of science, it is advantageous for general argument, to assume certain conditions as being undeniably, if not absolutely true. Now the mean pressure exerted upon the surface of the earth by the atmosphere, as indicated by the barometer, equals a column of mercury 30 inches high; that is, the column of air pressing upon the open end of a bent tube filled with quicksilver, exactly balances that quantity, which represents a pressure of 15 lbs. upon every square inch of surface. Here then is a natural scale for ascertaining the pressure; which pressure is a compound of the weight of the gaseous envelope, and the elastic force of the aqueous vapour contained in it. Various contrivances have been from time to time suggested, but no faith can be reposed in any other method except the expensive ones of triangulation and levelling. My own recorded trial of ascertaining the height of Mount Etna in 1814, by means of boiling water and a very sensitive thermometer, was but an experiment.

The first of the communications alluded to was intituled 'Remarks on the Use of the Aneroid Barometer,' by Colonel Yorke, late of the Scotch Fusilier Guards, and now your Honorary Secretary; who, during a journey upon the Continent last summer, gave that instrument a very fair comparison with an ordinary barometer under different circumstances and at different heights, the whole of which he has placed before the Society in a tabulated form. From the result of these operations, Colonel Yorke is led to conclude this instrument may be used satisfactorily when sudden changes of atmospheric pressure are desired to be shown; also to determine differences of level, when it can be compared before and after the observations, and within 24 hours, with a good ordinary fixed barometer. The aneroid should, previously to being used, be carefully tried with the barometer, at low pressures under an air-pump; and when in use, should always be observed in the same position.

The second paper on the subject was from Dr. Buist, of Bombay, F.R.S. This gentleman has entered fully into the construction and use of the Aneroid Barometer, and carefully compared it both with the Torricellian tube and the Mountain Sympiesometer. Among other remarks on the Aneroid's performance, Dr. Buist says, in summing up, "Should Mr. Adie's surmise prove correct, and the Aneroid at pressures under 28 inches cease, as at present cut, to harmonize with the barometer, it would be well, with an instrument so compact and convenient, to see whether a series of Aneroids could not be so made as to serve in succession for any ordinary elevation ; or whether the portions of the scale lower than those on the common Aneroid might not be so altered as to afford the correct pressure. One instrument might serve for the first 2000 feet, a second when only marked up to 28 inches might carry us 2000 feet higher, and so on. The matter might be very easily determined under the receiver of an air-pump, without actual ascent, the barometric gauge with a good scale answering as well as the barometer itself."

Now it must be remembered, that after the first introduction of this misnomered instrument at the Swansea Meeting of the British Association, in 1848, it was so successfully advertised as a perfect means both for meteorological observations and for obtaining differences of level, that many travellers, captivated by its ingenuity of principle and handiness of structure, together with its portability and facility of observing, were induced at once to substitute it for the mercurial barometer. On an examination of the instrument, however, it struck me that these assumptions were too hasty; for, notwithstanding its being so beautifully compact, and its capability for showing average differences, I could not but consider its complexity as an obstacle where a traveller could obtain neither workmen nor comparison, so that injury would be irreparable, and errors might remain without detection. A trial which was made with a friend, Mr. A. K. Barclay, on Leith Hill in Surrey, which is 993 feet in height, was satisfactory; but then we had a standard barometer to refer to both before and after the operation. Further inquiry showed me that ulterior improvement is wanting before the Aneroid can be trusted otherwise than as a journeyman to the Torricellian tube, in the manner of a job-watch to a box-chronometer. But still, if it will only serve for heights of 3000 feet, its use as a travelling instrument is very limited indeed; and we have just seen the adjustment for fresh starts proposed by Dr. Buist. When the atmosphere becomes more rarefied than the gas contained in the cylinder, its corrugated surface dilates to its full extent, and ceases to exercise any influence upon the levers and index of the dial plate; so that the latter is liable to become stationary at an elevation of between 3000 and 4000 feet. Hence the indications are very anomalous in extreme cases, the very ones in which a traveller would have most need to use it, namely, in measuring mountains, not hills. Other objections may apply to the moveable index and the perishable materials used within the case, while the scale is nothing fixed in nature, and can never be treated *per se;* nor can either the zero point of the scale, nor even the value of it, remain constant.

I therefore consider it a duty to remind you, that as the machine depends altogether on the accuracy of the experimental trials of the workmen, which you have no hold over, no Aneroid observations can be absolutely depended on, and therefore cannot be used for any scientific purpose, unless the particular instrument has been tested by comparison with a barometer at three different and distant parts of the scale, before and after the observations.

EUROPE.

Although Europe has been so well trodden that few actual or exciting geographical discoveries are to be expected, still the exertions of science are constantly directed towards investigating the substantial elements of its state, and accurately ascertaining the surface, so as to rectify the chorography of its various countries.

Regarding the coast survey of the British Islands, it is perhaps only necessary to say that it is progressing with regularity and precision. Our naval surveyors, under the directions of the Lords Commissioners of the Admiralty, are pursuing their labours with their usual energy; adding every year to our correct knowledge of Hydrography, as well as of her parent Geography. At home, the South and East coasts of England are undergoing a rigid examination by Captains Bullock, Sheringham, and Williams; those of Ireland by Frazer, Church, Bedford, and R. Beechey; and those of Scotland by Robinson, Otter, and Thomas. Captain Frederick Beechey is pursuing his valuable investigation of the laws which govern the tides of the North Sea, in continuation of his previous observations of those in the Channel, and is now about to communicate some unexpected results to the Royal Society. And especial mention should be made of a magnificent chart of the Tyne to above Shields and Newcastle, on a scale of 27 inches to the mile, and 36 feet in length, which has just been completed by Mr. Calver, one of the most active of our hydrographic force, who has now undertaken the survey of the Humber from the sea to Hull, and from Hull to Goole. Here I cannot but advert to one of the great benefits of our present system of minute and accurate surveying—that it shows the growth, change, or removal of deposits of sand or silt in our harbours, thus becoming the only trustworthy evidence to which either the Government or Parliament can appeal from the contradictory statements of interested parties.

Such is the steady but unpretending progress of our home surveyors:

abroad they are no less zealously occupied. Captain Bayfield's important survey of the St. Lawrence, which commenced thirty years ago with the remote waters of Lake Superior, came down along the shores of that noble river and embraced the whole circuit of the Gulf; and he is now completing his gigantic task by the survey of Breton Island, with all its unparalleled inlets and water communications. In the same quarter of the world Commander Shortland has undertaken the completion of the Gulf of Fundy, which was so successfully begun by that veteran surveyor, Rear-Admiral W. F. Owen. In the West Indies, the coasts of Central America having been already executed, the great chains of the Antilles and Caribbee Islands are the interesting field of Lieutenant Lawrence's unremitted labours. Commander Spratt has just been dispatched to complete the coasts of Candia, which the Society will regret were not allowed to be finished by the indefatigable Captain Graves, in order to crown his long and arduous services in the Archipelago; nor will the regret subside on learning that his ship was taken from him, to the hurtful interruption of his valuable work, on the plea of economy.

Of the Australian Seas, the truly devoted exertions of the late Captain Stanley have given to us, in the Southern Coast of New Guinea, a gratifying conviction that the Admiralty having thus broken ground in the Pacific, will steadily advance from group to group till its islands possess a somewhat less chaotic appearance in our charts. Captain Lort Stokes—from whom we received a description of the southern shores of the Middle Island—having already worn out his vessel, the 'Acheron,' in examining the distant but little known shores of New Zealand, Captain Drury has been directed to carry on that now most necessary survey to its completion; and lastly, in the East Indies, the 'Royalist,' under Commander Bate, is exploring the forest of insulated rocks which are such a remarkable feature in the China Sea.* He is also adding to our charts the dangers and the resources of Palawan Island, a free passage round the eastern shores of which will occasionally save our China-bound vessels much time and much risk. While the views of the Lords of the Admiralty are thus directly contributing to our stores of hydro-geographical knowledge, the several expeditions which, from humane and not less enlightened motives, they have sent to the rescue of our long absent countrymen with Sir John Franklin, cannot fail to add indirectly to our knowledge of those sterile

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* China Sea is a barbarism, grammatically indefensible, but so completely established by long usage that we cannot get rid of it. If navigators had thought of what an appearance *England Sea* or *France Sea* would make in their logs, they would never have sunk in the gulf of China Sea.

Arctic regions, which probably would otherwise have for ever remained unvisited. Already has Captain Kellett made some discoveries in Behring Strait; and even Commander Pullen, in his miserable boats, had added some islands to the American shore of the Polar Sea.

It will be obvious that this accumulation of accurate information must be eminently useful for future ages, and to all nations; while the promptness of publication adopted by Admiral Sir Francis Beaufort is worthy of imitation, in every country where extensive surveys are undertaken.

Respecting our great Ordnance Survey, I regret to say that our present information is neither so immediate nor so precise as when it was under the able conduct of General Colby, one of the first members of this Society, an officer who was in the habit of earnestly consulting the wants and wishes of the science. It is true that we have no reason to complain of any particular discourtesy at head-quarters, but the communications of late have borne rather on the actual results of the operations than on the methods adopted or progress made. Thus we learn that the Board is still engraving and publishing the maps of the northern counties; and that its surveyors have broken ground in Scotland, the final topographical examination of which is expected to yield results of great interest in various branches of inquiry.

The Geological Survey of England has considerably advanced during the past year, notwithstanding no more sheets have been published since I last addressed you; but the whole of North Wales has been completed, and the last sheets (77 and 78) are in the engraver's hands, while numerous illustrative sections have been preparing. Of the important mineral districts in Central England the maps are in a great state of forwardness, although not quite ready for actual publication. The Staffordshire coal-field, in sheet 62, is nearly completed; and of the Derbyshire mining district, 81, N.E. and S.E. are on the plates, and the other sheets are in such an advanced state, that they will probably be published during the summer. This portion of the survey, including parts of Warwickshire, Staffordshire, and Derbyshire, will assuredly throw a very important light on the mutual relations of our coal-fields, and on the probability of making valuable discoveries beyond their supposed limits, and over areas where the surface is occupied by later formations. In the Peak of Derbyshire the *tracé* of the very numerous lead-veins has been most carefully given for the first time, since, although they have been the scene of important mining operations from the time of the Romans to the present day, the peculiar mineral laws of that tract of country, and the consequent minute subdivision of the mining ground in the metalliferous districts, have hitherto prevented our obtaining a general view of the subject. In Ireland the county of Wexford has been published, and Dublin is now ready, though unfortunately on a small and unsatisfactory scale; added to which, the arbitrary and unphilosophical division by counties, is an obstacle to the appreciation of physical facts.

Such have been the labours of our public departments in the past year; nor have our other practical geographers been resting on their oars. Mr. Arrowsmith has constructed the Isthmus of Darien, from the surveys of Belcher, Kellett, Wood, Barnet, Fidalgo, Lloyd, Hughes, Garella, and other authorities, on an elephant sheet. He has likewise engraved on a similar sheet the Eastern Frontier of the Cape Colony and part of Kafir-land, and a map of the district of Natal. He has also published a single-sheet map of the Mining District of California, from the surveys of Captain W. A. Jackson, with letter-press accompaniment. Mr. Trelawney Saunders has continued his attention to the regions of Central America; and, among other publications, I cannot but call your attention to the elaborate physical maps of the British Isles, drawn up by Mr. Petermann, and indicating the peculiar features of the surface, the seats of industry, the agricultural and mining districts, the population, and the temperature and rain. I must also specially note a set of physical maps of the world, by the same gentleman, beautifully engraved on stone, and sold at the price of a penny; which from their small price and intrinsic value cannot but render them extensively available for the purposes of education. Mr. Petermann has likewise drawn and engraved a map of Borneo for the Borneo Church Mission, which gives the fruits of the surveys of Belcher, Gordon, and Mundy, together with the recent Dutch explorations in the interior; moreover it possesses peculiar claims on our attention as essentially modifying our hitherto conceived notions of the shape of this immense island, which will one day bear no uninfluential part in the affairs of the East. Another attempt to supply the public with maps of tolerable accuracy at a very cheap rate should be noticed; I allude to the Atlas of Penny Maps engraved by Mr. Joseph Wilson Lowry, one of your Fellows, and now publishing by Chapman and Hall, specimens of which have been placed before you. These maps are all drawn according to a particular system of scale and proportion; and in the coloured ones, each scale is distinctly indicated by a different colour. The impressions are taken by surface-printing from blocks electrotyped from the original plates, a process termed Glyphography, the work standing up in relief. Although the prints by this method have not the delicacy of a copper or steel engraving, correctness is not impaired by it; while the cheapness of surface-printing places good maps within the reach of the humbler classes.

A bold attempt to impart geographical knowledge to the million has been made by another of our Fellows, Mr. James Wyld, M.P., in the construction of the gigantic globe now fitting up in Leicester Square; an effort at once onerous, toilsome, ingenious, and expensive. This colossal figure of the earth is modelled on a scale of 10 geographical miles to an inch horizontal, or 6 inches to a degree; and it is 1 mile to an inch vertical, while the diameter is no less than 65 feet. Visitors will pass into the interior of this huge ball, and by means of a gradual ascent to successive stages, will view every part of the vast model from a very moderate distance. Mr. Wyld was good enough to show and explain to me the whole of his undertaking; and though the work was not then sufficiently advanced for minute criticism, I confess being both surprised and pleased on the whole. It is made up of some thousands of raised blocks, or castings in plaster from the original models of mountain and valley, sea and river, in clay, the fitting of which has been one of the principal difficulties which the constructor has had to encounter. Recollecting that only a limited part of a sphere can meet the eye at once, it occurred to Mr. Wyld that by figuring the earth's surface on the interior, instead of the exterior of his globe, the observer would be enabled to embrace the distribution of land and water, with the physical features of the globe, at one view: and in this he has in substance succeeded; while, from the great size, the examiner of details is hardly aware that he is gazing on a concavity. The attempt is well worthy of the projector and the spirit of the age.

The great geographical works to which I alluded last year have been issuing periodically from the press, and as yet realize their professions. The several parts have been placed on your table as soon as published. Of Knight's 'Imperial Cyclopædia,' the first six parts of the Geography of the British Empire—A to D—are completed; and it is embellished with maps and views, principally of churches and public buildings. Of Fullarton's 'Gazetteer of the World' the two first volumes are placed in your library, where they have been examined by many of our members: they comprise the names of places alphabetically from A to D, and are illustrated with very beautiful engravings of chorographical maps, plans, and views. The 'General Gazetteer' of Messrs. Blackie has made a similar advance, and the number of its names will be nearly doubled, although the compilers do not intend to make its claim to public approval altogether dependent upon so uncertain a test, as the numerical strength of names in its alphabet.

Colonel Jackson, your late secretary, has recently translated a very useful work, the 'Military Topography of Continental Europe,' by M. Lavallée, wherein the surface features, slopes and basins of Europe, with the rivers and their affluents, are ably set forth. The Colonel has also published an excellent manual on Military Geography, showing its nature, object, and importance. But among the various publications of merit and interest to our pursuit, let me not forget a small periodical, the 'Church Missionary Register,' a monthly journal which commenced two years ago, and has been presented to your library. This well-conducted work, although mainly directed to the higher destinies of man, diffuses a large fund of important geographical information, as well as striking views into the manners and habits of many tribes.

In France the recent march of geography has been more useful than brilliant, and exertions have been made rather to open new outlets for commerce than to seek fresh discoveries. The publication of several books of travels, printed at the expense or with the assistance of Government, has been continued, as well as the 'Voyage dans le Nord' by Gaimard, and the 'Voyage de la Bonite,' while those of MM. Galinier and Ferret in Abyssinia are now on the point of being completed. The narrative of a residence in the capital of Thibet by M. Huc, a Lazarist missionary, contains some corroborative details respecting a country imperfectly known to Europeans. Three volumes of M. de Castelnau's Travels have appeared, embracing his journey from the coast of Brazil to the Bolivian frontier. An English naturalist who accompanied him, Dr. Weddell, is the author of a supplementary volume, which embraces the southern provinces of Bolivia, and describes the celebrated deposits of fossil bones in that region, with many botanical and other details.

The Dépôt de la Guerre has published several new sheets of its large military map of France during the past year, and considerable progress has been made of the same map on a reduced scale $\frac{1}{320,000}$, a portion of which will be published this year. The survey of the departments not yet completed has also made considerable progress under the able direction of the newly appointed chief of the topographers, Colonel Peytier. A map of Greece in 12 sheets, commenced many years ago, is now nearly completed, and will prove a great boon to geographers and travellers. The French hydrographical department has been principally engaged during the past year in publishing materials which have been long accumulating in its archives. No new surveys have been undertaken; but our friend Mr. Pentland understands that it is the intention of the Minister of Marine to resume the surveys of the west coast of Italy and the north coast of Africa, interrupted by the troublous events of 1848. Mr. Pentland brought over a couple of sheets of the southern coast of France, which are beautiful specimens of topographical engraving. The 'Annales Hydrographiques,' a work published by the aforesaid Dépôt, contains an account of their publications as regarding charts, plans, and nautical instructions.

At Brussels the veteran M. Joachim Lelewel is continuing his researches into the geography of the middle ages, of which he has recently published the Atlas of the early epochs; and it is well that sources of chartography should be studied, since the progress of commerce and navigation is so intimately connected with the great events of the world. But this is not all, for those who consult only the newest maps can but reap that information which the particular compiler may happen to give. You will recollect the vellum Portulano of 1547, which Sir Thomas Phillipps, at my request, exhibited to you; a curious volume, representing the Spanish and Portuguese discoveries in the old and new worlds. In this the dangerous reef of the Skerki are well placed, rocks which afterwards disappeared from most of the charts; and the disbelief of their existence occasioned the loss of a 64-gun ship, the 'Athénien,' and 351 of her crew, so lately as 1804. Among other matters the sources of the Nile are carried in that manuscript to a mountainous country, south of the equator, and two inland lakes seem to indicate the recent discoveries. The exploits of Sir Thomas Candish between California and Panamá are not very clearly traceable on modern charts; but in a MS. Derrotero of the South Sea, belonging to the Society of Antiquaries, there is a bay near the Ensenada de Nicoya, and between it and Panamá, in which is written "En esta ensenada dio carena a su não Thomas Candi Yngles qr entro por el estrecho de Magellanes año de 1587." Now this cove, sheltered by the Ysla del Caño, was not known as a heaving-down place in 1790. This curious volume was drawn up in Panamá in 1669, and dedicated to the Sovereign Queen of Angels and Men, Maria, Madre de Dios. In the gulf before that city a shoal is marked between the Pearl Islands and the main, called S. Josef, against which is written, "En este baso se perdio la Almiranta del Rey año de 1631;" yet Dampier, notwithstanding his adventures near the spot, does not seem to have been aware of his proximity to danger. The subject however is well broached, for Cardinal Zurla, Viscount Santarem, and M. Jomard have been doing for the geography of the middle ages what Major Rennell and M. Gosselin did for the classical era.

The southern states of Europe have not exhibited a remarkable animation either in geographical publications or surveys, and the principal feature of the year is perhaps the Physical Geography of the Alps ('Untersuchungen über die Physicalische Geographie der Alpen') by the brothers Hermann and Adolph Schlagintweit of Bavaria, who were so recently our visitors. This very important work is divided into four principal parts, the Glaciers, the Geology, the Meteorology, and the Botany of that mountain chain, each of which is treated in a masterly manner, and not the least valuable portion is the measurement of the heights of the various summits.

Germany, as usual, has displayed an eminent industry in the cause of geography, whether in publications, travels, or scientific inquiries. Professor Ritter has published the first portion of his 'Geography of Palestine,' which forms the 15th part of his 'Erdkunde von Asien,' a work which promises to be the most comprehensive and—if not too much hurried—complete which has yet been published on that country. Professor Berghaus has completed the divisions of his Physical Atlas to which I alluded last year, and has also published the second volume of his 'Geographische Jahrbücher,' which contains a luminous résumé of the chorography of Africa, rendered particularly valuable by the full bibliographical notes and quotations. Baron de Wrede, whose interesting excursion in Hadramaut, in south-eastern Arabia, is printed in your Journal, is about to publish the results of his 'Sixteen Years of Travels in the East.'

The most important of the maps published in Germany during the last year, and presented to us, is Professor Koch's examination of Mount Caucasus; it is on four sheets, and beautifully executed to a scale of $\frac{1}{1,000,000}$. This enterprising traveller spent many years in exploring Asia Minor and the Caucasian countries, and has made extensive researches and surveys, which, together with the Russian Government operations, form the basis of the map. It is a very complete compilation, and is coloured politically, ethnographically, botanically, and geologically. Major-General Oberreit of Dresden has forwarded the 3rd part of the 'Atlas of Saxony' for our library, and from the *Etat-major* at Munich we have received sections of the 'Topographical Atlas' of the Kingdom of Bavaria. The munificent gift from Austria of the collection of important geographical works to be first shown at the World's Exhibition has been already mentioned to you; and Lieutenant-General Skribaneck enumerates among the labours of the year at the Institute of Vienna parts of the special map of Bohemia on a scale of $\frac{1}{144,000}$, a map of Italy in 27 large sheets on a scale of $\frac{1}{288,000}$, and other similar works. Of the Prussian Government-survey, sections 35 to 38 of the Map of the Province of Brandenburg, and sections 49, 50, and 51 of that of Westphalia, have been published.

The scientific exertions of Denmark have been somewhat retarded by recent political events; and enterprise will be further damped by the death of Professor Schumacher, a man of rare mathematical and philological acquirements and unwearied application to business. Besides establishing that cosmopolitan bond of scientific union, the 'Astronomische Nachrichten,' it will be recollected that he superintended the measurement of the Danish arc of the meridian, and made various chronometric journeys for the express purpose of fixing longitudes.

The 'Topographical Survey of Sweden'—which is to consist of 260 sheets—is advancing rapidly, and much interest has been excited by the continuation of Struve's Grand Arc through Norwegian Lapland to the North Cape, the Swedish portion being undertaken by Professor Selander of Stockholm, and the Norwegian under the direction of Professor Hansteen of Christiania. Lieutenant Kloumann and the gentlemen who were sent to measure the base near Aetenfjord, in Finmark, had many obstacles to contend with from the excessive rigour of the climate, among glaciers and on steppes several thousand feet above the level of the sea; but every difficulty was zealously encountered, and the whole work is probably now done. A chronometric expedition has been employed in ascertaining the difference of longitude between the observatories of Christiania and Copenhagen, and various chartographic works have appeared both in Sweden and Norway. The maps constructed by the Crown Prince, Carl Ludwig Eugène, lately exhibited before us, were replete with physical information respecting the districts represented, but more especially the water, mineral, and forest features; and our Society pointedly marked its approbation by immediately electing his Royal Highness an Honorary member.

Professor Nilsson has sent Dr. Thurman's letter on northern antiquities ethnologically considered, together with a learned disquisition on the changes of surface which Scandinavia has undergone in later times, for a clear translation of both of which from the Swedish language I am indebted to Dr. Shaw; and General Carl Akrell of Stockholm has written a memorandum of the geographical works that have lately appeared in Sweden. Of these the principal seem to be a new edition of Tuneld's 'Geography of the Kingdom,' in 8 volumes; the Statistics of the same by the late Colonel Forsell, an Atlas of Sweden by Baron Hermelin, and the Maritime Atlas of the late Admiral Klint. Some operations are also in hand between Torneo and Alten for the future solution of the question as to whether the surface of Sweden is rising or the waters of the Gulf of Bothnia are receding.

Although my Russian correspondents have not been altogether so alert as could have been desired, we have received indications of their recent geographical progress; and the first volume of the Memoranda of the Geographical Society of St. Petersburg has been placed on our table. It is well known to you that the survey of this vast empire has long been in hand, that much is achieved, and that much still remains to be done; and the grasp of the undertaking may be estimated when we recollect that the intermediate space between the Baltic and Black Seas comprehends twenty-one large provinces, on which the Imperial Staff has been employed trigonometrically, on an unprecedented scale, for the last thirty years; yet this is not above one quarter of Russia in Europe! In the course of operations carried on by different parties, with different instruments, and perhaps using different methods, difficulties would occur in the ultimate arrangements; and the necessity of measuring an arc of the meridian—the only true foundation of geographical and absolute accuracy—became obvious. Under the management of my able friend, the elder Struve, this crucial operation was commenced on the banks of the Düna, in the year 1820, whence it gradually increased in length, till, in 1845, it extended southwards to Ismaïl, near the Black Sea, and northwards to Torneo, at the head of the Gulf of Bothnia—the whole forming the unprecedented measurement of an arc of more than 20° in length. Struve, however, was not yet content; for he then proposed to the Swedish Government that, with their co-operation, the line should be carried to the Polar Sea, 4½° further. The measurement is now finished, but I believe the observations are not yet worked out.

There are, gentlemen, as is known to you all, two great objects for which the regular trigonometrical survey of a country is undertaken. The first of these is the correct ascertainment of the exact co-ordinates for placing the various stations relatively to each other, and to the equator as well as meridians of the terrestrial spheroid, for the purpose of forming an accurate map: the second is to determine the dimensions and form of the earth, by ascertaining the curvature of a given portion of its surface. This determination is a problem of the greatest importance in astronomy and geography, as well as of high general interest and curiosity. The irregular figure of our globe is the cause that the geodetic meridian is not a regular curve; and although theoretically it may be viewed as one of the series of consequences resulting from the gravitation of matter, geographically considered, it is a fact to be determined by actual measurement. Mr. Maclear's repetition and extension of La Caille's arc in Caffraria, with better means and more time, has ignored the supposition, so long entertained, that La Caille had detected a sensible difference in the shape of the earth in the two hemispheres.

The Emperor of Russia aided the Imperial Geographical Society in the expense of sending an expedition to the Ural Mountains. It set out last June; and, though troubled by the differences of dialect among the Samoyedes, Ostiaks, and other native tribes of the places passed through, explored the high and arid chain lying between 64° 30′ and 65° 30′ N. The passage of the Sarti, 2000 feet above the sea, was extremely difficult. Colonel Hofmann also, one of our Honorary Members, having published his travels in Eastern Siberia, visited the southern Ural; and his excursion is full of geographical interest respecting the aspect of those regions, the auriferous veins, and the vast primeval forests which cover the flanks of the Sayan Mountains.

Prince Emanuel Galitzin has announced that a remarkable group of islands has been discovered in the Sea of Aral, which were hitherto unknown; they were seen and visited by M. Boutacheff, an officer employed in the 'Constantine' on a survey of that sea. The Prince also mentions that M. P. de Krusenstern, son of the celebrated Admiral of that name, has begun the exploration of Nova Zembla: he will continue it this year, and at his return we have reason to hope for much information respecting this remote island.

An important work was published at the commencement of this year, by the Ministry of State Domains in St. Petersburg; it is intituled 'The Agronomical and Statistical Atlas of European Russia;' and a copy has been presented to us by Baron Brunnow, with a translation of the explanatory notes by Count Wielhorsky. The plates are elaborately compiled and carefully coloured; and they treat of the geology, climate, population, agriculture, flocks and herds, average cereal crops, forests, and distribution of the cultivated and uncultivated districts.

Sir Walter Trevelyan, of this Society, tells us of Mr. Lundt's having informed him that he last year visited the coast of Greenland, from the 61st to the 72nd degree of N. latitude; that he discovered, and has brought to England, specimens of rich ores of plumbago, galena, ironstone, cryolite, and sulphuret of copper, containing from

66 to 70 per cent. of metal; and that he found abundance of coal in latitude 72°. But the site of his travels recalls a topic which retains its painful interest and mysterious uncertainty unbroken; and it is a severe disappointment not to be enabled to congratulate the Society on the rescue of its gallant member, Sir John Franklin, and his meritorious companions, from their long imprisonment in the Arctic regions.

On this occasion last year I had the pleasure of stating that measures of a most comprehensive nature were about to be taken for exploring those portions of the icy seas where it was supposed the missing ships might be found; and it was not unreasonable to hope that where so many hands were held out to save, one at least might prove successful. But, although no immediate tidings of our unfortunate friends have reached us, the labours of the searching squadron last year were not altogether fruitless; for, by the unexpected return of the 'Prince Albert,' which you will remember was dispatched by Lady Franklin to search Regent's Inlet, but was prevented by heavy ice, we are put into possession of facts which destroy the supposition that the 'Erebus' and 'Terror' foundered in Baffin's Bay. Traces of an encampment, and relics of the visit of a party, were found on Cape Riley, at the S.E. entrance of Wellington Channel; and, from the investigations which were made, it is almost conclusive that the vestiges are those of a party who were landed on the Cape for the purpose of making magnetical observations.

As the searching ships, and those sent out by the United States, may be supposed, from the aspect of affairs when the 'Prince Albert' returned, to have succeeded in making a considerable westing before the setting in of winter, we are not unwarranted in hoping that they have fallen in with the objects of their toils, or at least have discovered more definite traces of them. And it is most gratifying to find that the Russian authorities have given orders to place boats and men at our service along the coast of Eastern Asia; and every facility will be afforded to our officers in the prosecution of their inquiries through the Russian dominions.

The expedition through Behring's Strait had not been successful when last heard of. Captain Collinson, having been baffled by ice, deemed it prudent to winter at Hong Kong; but Captain M'Clure, with better fortune, had conducted his ship through the Strait, and was pushing on in the direction of Banks's Land. Now, unless the Arctic seas should be more than usually ice-bound, we may confidently look forward to the return of one or more of the searching ships in the ensuing autumn. I cannot forbear, however, warning the Society against such absurd and cruel reports as have already been foisted upon them. Captain Kellett, who has been so much engaged in Behring's Strait, declares that the coast "is alive" with stories respecting the absent crews; and that "the Esquimaux are ever ready to exercise their ingenuity by inventing a story."

Animated by an energy which circumstances have rendered nearly desperate, Lady Franklin has, from her own private resources, again dispatched the 'Prince Albert' to Regent's Inlet, to carry into effect what the ice prevented from being done last year. The command has been confided to Mr. Kennedy, formerly in the service of the Hudson's Bay Company; and among the crew, who have volunteered to go, is Hepburn, who served under Sir John in his memorable land journey, and has been restlessly eager to proceed in quest of his former chief. *Gaudet tentamine virtus!*

ASIA.

This vast and wondrous quarter of the globe, once renowned for arts and learning, and perhaps the very cradle of civilization, had subsequently been for ages all but unknown; yet was that region of the gravest interest to the rest of the world, whether viewed in an historical, chorographical, ethnological, or commercial light. Of late years our knowledge has been much enlarged through the liberality of the East India Government and the untiring efforts of a numerous corps of zealous and efficient explorators: much, however, still remains to be done, and we have heard both complaints and regrets that the surveys of Western India, which might have been published twenty years ago, should have been so long in hand, as well as that the numerous statistical documents collected by the surveyors have been withheld from the public.

The grand trigonometrical survey of India continues to proceed satisfactorily, under the able superintendence of Lieutenant-Colonel Waugh, the Surveyor-General. According to the last Report, the Punjáb series has been extended beyond the meridian of Lahore, towards Peshawar, near which it is proposed to measure a base of verification. Another longitudinal series is in progress, under Captain Renny Tailyour, from the base near Seroor, towards Kurrachee, where another line of verification will be measured. The party has already reached the borders of the Great Desert. A third band of surveyors has been formed to branch off from the last-named, and triangulate Gujerat and Kattiwar. The geodesy of the Bombay Presidency has been connected with Captain Tailyour's work, and the topographical surveys advance simultaneously with the trigonometrical operations. The south coast triangles, which are intended to connect those of the Madras Presidency with the Calcutta base, proceed but slowly, owing to the insalubrity of the country where those works are carried on. While these are the labours abroad, the co-operators have not been idle at home; for, under the active superintendence of Mr. John Walker, a Fellow of our Society, forty sheets of the Indian Atlas have now been published, and there are sufficient documents for twelve more, which are now in the hands of the engraver. These operations have certainly been costly, since the expenses already incurred amount to more than 360,000*l.*, besides all the instruments, as well as incidental and home expenses: but money was never better expended, whether we consider the honour reflected on the Directors, the intellectual character of the officers, or the absolute means obtained for improving the resources of the country and the condition of its people, the settling of disputed boundaries, assisting judicial decisions, and accurately defining public and private property.

Nor have the Honourable Company's marine surveyors been less diligent than their brethren on shore. The Coromandel coast, from Ennore, in latitude 16° 30′, to the Sautapilli Rocks, in 18° 5′, including a minute survey of Coringah Bay, has been completed by Lieutenant Fell, of the Indian Navy, and will be published very shortly. The remaining portion of the N.E. coast of Africa, west of Cape Guardafui, has been surveyed by Lieutenant Grieve, and will be given to the public during the present year. It is expected that the entire coast of Western India, from the Gulf of Cambay to Cape Comorin, will be completed in the ensuing season; and Lieutenant Fell is at present engaged in the examination of the N. coast of Sumatra.

The elaborate Wind and Current Charts, constructed by Mr. M'Farlane, are commended as of great utility; and we hear that they are likely to be published under the auspices of the Bombay Geographical Society.

I must again express my sense of the valuable knowledge circulated by the periodical press of India, and may particularly mention the Madras and Singapore journals. The publications of Oriental societies are also rich in local information, and the Journals of the Asiatic Society at Calcutta, and the Bombay Geographical Society, are of great interest; nor should the 'Proceedings of the Royal Society of Van Diemen's Land' be unnoticed. I should also mention that a book has been printed at Sydney under the title of 'Australian Geography;' it was written by Sir Thomas Mitchell, a distinguished member of this

Society, for the use of the schools in New South Wales, at the request of the Denominational Board of Education. This gentleman informs me, in a letter of the 19th of last January, that he has compiled, from the best sources and his own explorations, a general map of the colony, which has been engraved at Sydney under his directions, and a presentation copy is on its way to us by the hand of a friend.

Among our own proceedings you will recollect that Lal Sing'h, a member of the Nepaulese Embassy to London, was introduced to your meeting by the Honourable H. E. I. Stanley, a Fellow of this Society; and that he addressed you on the geography of his country. According to Lal Sing'h, the boundary-line of the N. frontier of Nepaul is incorrectly laid down in all our best maps, and should be moved further N.; and Lieutenant R. Strachey had no doubt but the proposed alteration would be found substantially correct.

We were also favoured with a visit from the learned and enterprising traveller, Professor Hermann Abich, who read a communication entitled 'Climatological Notices on the Country between the Black and Caspian Seas.' In this valuable description of a singularly remarkable tract, the Professor called our attention to the intimate connexion between geology and meteorology, noticed the outlines of the extraordinary variety of climate in the lands between the Caspian and the Black Seas, and sketched, with great ability, the geological and orological structure of these countries, which he had minutely examined by order of the Russian Government. Nearly the whole of this region is under able exploration; for, beside the labours of Professor Abich, a report has been made of M. Brosset's travels in Georgia, by order of the Governor of Caucasus. Colonel Khodzko ascended Mount Ararat last August, for the purpose of making some delicate observations in order to complete the triangulation of Trans-Caucasia; and from a part of the regretted Hommaire de Hell's Journal, lately read to the French Geographical Society by M. de la Roquette, that traveller had passed through the Caspian Gates, the Persian defile so celebrated by Arrian.

Further southward much has been effected by the spirit and understanding of our countrymen, insomuch that the tracts between Aleppo and Basrah are now opened to view. And here I cannot but congratulate you on the learned and lucid dissertation which Colonel Rawlinson, one of our Council, read before you last month, on the identification of the Biblical Cities of Assyria, and on the geography of the Lower Tigris; wherein many of his explanations were founded on the authority of remains previously unknown or unnoticed, or derived from cuneiform inscriptions which scarcely any man but himself could have deciphered. Though this inquiry was essentially antiquarian and classical, it was also intimately connected with the geology and geography of those important regions; so much so, that such a view of the present state of that remarkable tract of country may lead to probable conclusions as to its future, as well as a clearer idea of its past condition. Some of the land along parts of the course of the Tigris had manifestly been elevated; but most of the changes of surface are due to the almost insensible inclination of the part irrigated and intersected by its rivers, from below the bifurcation of the Tigris to its confluence with the Euphrates. The whole of the alluvial soil from a great distance from their mouths, must have been gradually brought down and deposited by those mighty streams; and the extent is not of difficult ascertainment. The increment of land at the Delta formed by this action can be chronologically traced, and is found to have advanced since the commencement of the Christian era, at the extraordinary degree of a mile in 30 years, a rate of increase probably about twice that of the growth of the Sunderbunds, or any other known delta. This agrees, in fact, with the statements which Dr. Beke, one of your Fellows, published in the 'Philosophical Magazine' as far back as February 1834; and in his 'Origines Biblicæ' in the same year.

Lieutenant Richard Strachey, of the Bengal Engineers, read a very elaborate paper on the physical geography of the provinces of the Kumáon and Garhwál, in the Himalaya Mountains, and of the adjoining parts of Thibet; which narrative was beautifully illustrated by Mr. Arrowsmith. He began by giving a sketch of the general surface of Central Asia, pointing out that neither the Himalaya nor the Kouenlun appear to have any definite special existence apart from the general elevated mass of Thibet between them; which would thus seem to form the summit of a great protuberance above the general level of the earth's surface. He then detailed the physical features, culminating lines, palæontology, geology, meteorological phenomena, botany, and zoology of that stupendous region; and concluded by a sketch of the different races of men who inhabit it, drawn up by his brother, Mr. John Strachey.

The mapping of China remains, as far as I know, in the same state as when I last addressed you; for we have not heard anything farther from Dr. Gützlaff, nor has the Admiralty yet come to a decision on that head. I mentioned that it was the intention of the Hon. Edward Everett to present this Society with a copy of his curious Chinese map; finding, however, some difficulty in getting a true copy made, this gentleman has sent us the original. But excepting some 'Memoranda on Hong Kong,' by Mr. William Scott, we have had no direct communication on the geography of the Celestial Empire. The Admiralty, however, have published some corrected coast charts of Canton, Formosa, and Korea.

Scintillations of light occasionally flit from the islands to the eastward of Asia and the Polynesian Seas; in which last a mighty progression has taken place in less than half a century. When I was at Hawăï in 1807 we found the island and its population just as Captain Cook had left it; but now, instead of meeting uncivilized idolaters with no dress but the *tapa*, Christianized men are met at every turn habited in European attire—houses with glazed windows have superseded the wig-wam huts—the canoes have given way to schooners and ships—and instead of utter ignorance, the natives are instructed by three weekly newspapers!

I have mentioned Mr. Petermann's map of Borneo; and much public attention has been devoted towards that grandest of the Eastern Islands. From the 'Moniteur des Indes' we learn that Dr. Schwaner has accomplished an interesting journey through the interior of Borneo, from Banjermasing to Pontianak. His intention was to ascend the river Kayan by boat, and seek along its northern prolongation a course towards Kattingan, in the neighbourhood of which he expected to discover the sources of the Melawi. He found that the river runs through a very fertile and populous region, the inhabitants of which are described as having attained an advanced stage of civilization, and as being desirous of establishing commercial relations with the Europeans on the coast. The true designation of this people is *Uadju*. The river Kayan is said to be of sufficient magnitude to allow of easy intercourse with this inland tribe. Dr. Schwaner continued his route towards the river Kapuas, with the view of determining the distance between the two streams, and ascertaining the character of the mountains separating them. It is to be hoped that our Society may soon be put in possession of fuller details respecting the Doctor's expedition than are afforded by the 'Moniteur.' Some interesting information regarding the aboriginal inhabitants of the island has been received from Mr. M'Dougall, of the Borneo Church Mission at Sarâwak, who estimates the population as approaching to the hitherto unlooked for amount of six millions!

I have been anxiously expecting tidings respecting the long-absent Dr. Leichhardt, but the gloom which hangs over his fate has not, in the slightest degree, dispersed. My friend Capt. P. P. King, R.N., in a letter from Paramatta of so recent a date as the 2nd of March, says, "Not a word yet of Leichhardt, whose time is up. A Spanish frigate, 'La Ferrolana,' has just arrived here from Swan River, where they had not heard of him. I am sure he will have pressed on to cross the Desert, and there he must have starved for water. The colonists have been making a stir about going in search; but I fear that he has fallen a sacrifice to his zeal and perseverance in trying to cross the wretched country which exists in the western part of these regions. Had anything happened to him in the early part of his journey, the mules would have returned to the settled districts." In this painful uncertainty, your constant friend, Admiral Sir Francis Beaufort, took charge of a letter requesting the Admiralty to direct a ship to look in at the deserted Port Essington now and then, under the chance of learning something of the traveller's fate.

Among the papers which were read this session, was one on the South Sea Islands, by Captain Erskine, of H.M.S. 'Havannah,' who officially visited the Samoan, the Friendly, the Feejee, and other groups of islands. In his brief but instructive remarks Capt. Erskine dwells upon the treacherous character of the Feejeans, and asserts that they are addicted to cannibalism to a degree neither known nor credited: and that although the murder of shipwrecked persons there is supposed to be a religious duty, there can be little doubt that the desire to eat the bodies is the principal cause of its continuance, human flesh being esteemed beyond all other kinds of food. "About the end of July," he observes, in his official Report, "three weeks before the arrival of the 'Havannah,' 14 women and 1 man belonging to a neighbouring town (with whom no war existed) had been stolen from the reefs, whither they had gone to pick shell-fish, and brought to Bau, to entertain the people of a tribe who had arrived there with their periodical tribute, two or three having been previously entrapped from other quarters and eaten. The missionaries, Messrs. Lyth and Calvert, were absent from Vewa at the time, but their wives immediately crossed over to Bau, and having in the most daring manner forced themselves into the house of Tanoa, the father of Thakambau (a piece of sacrilege for women to attempt), begged the lives of these unfortunate wretches. Ten had already been slaughtered (two of them in the hearing of these heroic ladies), but the lives of the remainder were granted to their intreaties. On my visit to Bau I was shown the remains of the bodies suspended to trees, and the ovens in which they had been cooked, by some of the persons in whose behalf this feast had been prepared, with evident surprise on their part that such a sight should excite any feelings of horror or disgust."

This distressing recital led to an argument in which humanity and feeling bore hard upon judgment; for though the practice of anthropophagia is revolting to our ideas, there can be no reasonable doubt of its existence throughout a large portion of the Pacific Ocean. Capt. Fitz-Roy assures us that it also prevails among the miserable Fuegians; and information from Mr. M'Dougall confirms the rumours, long circulated, of cannibalism in Borneo. It seems that a Dyak who had travelled from the interior to Sarâwak for medical assistance, told him of a race on the borders of his own tribe, who were perfect gluttons in human flesh, preferring it to any other food. He minutely described the cutting up and cooking of the victims, men, women, and children; adding, that with the exception of this horrible propensity, they are a very good and honest people.

The existence of so abhorrent a practice in New Zealand, Tierra del Fuego, Sumatra, the Andamans, Borneo, the Feejee, and other islands, in places exuberantly fertile as well as those which are sterile, proves that hunger is not the only motive for an abomination which, in numerous cases, is evidently independent of necessity.

AFRICA.

Though all beyond the coast of Central and Southern Africa is still almost a blank in our maps, yet the determined enterprise and activity of Europeans, and especially of our own countrymen, are continually breaking through the barriers hitherto opposed by the barbarism of the natives and almost impassable deserts, at a short distance from the sea in nearly every part of that still benighted quarter of the globe.

Unlike some of the trackless wastes of the interior—*leonum arida nutrix*—Egypt has exhibited a lively resuscitation after many ages of torpor; and now promises, more than ever, to be the passenger-path between Great Britain and her Eastern Dependencies. The recent masterly operations of M. Bourdaloue for levelling the Isthmus of Suez, have produced a result differing widely from that of the harassed French savans in 1799: for he has shown, that instead of a fall of 30 feet, he detected little or no difference of elevation between the level of the Red Sea at Suez and the Mediterranean at Pelusium. That experienced and intelligent engineer, Mr. Robert Stephenson, has lately examined the site, by walking over the greater part of it; and he has been kind enough to show me his route on a map of large scale. This gentleman gives reasonable grounds for concluding that the Bitter Lake was formerly the head of the Red Sea, with the cities of Serapeum and Taubastum—the extensive ruins of which now stand in an arid desert—bordering the beach. The ridge between the Red Sea and the Bitter Lake, not above 7 or 8 feet high, he considers to have resulted from a geological upheaval, the fossils and shells on both sides of it being abundant and identical. From an investigation of the Canal of Sesostris, the Lake Tamsah, and numerous scattered vestigia, Mr. Stephenson has no doubt that the district was very fertile when Serapeum was built; and as he has actually undertaken the charge of constructing a railroad from Alexandria to Cairo, and from thence to Suez, we shall soon be in possession of every topographical feature of an intensely interesting country.

This reminds me that the recent archæological researches of Professor Lepsius, in the Valley of the Nile, have given rise to much geological discussion. This observant gentleman infers, from certain sculptured marks on the solid rocks at Semne in Nubia, as well as in the foundation stones of buildings, that the Nile must once have flowed at a level considerably above the highest point which it has ever reached during the greatest inundations of modern times; in fine, that the entire bed of the river in Lower Nubia must have been excavated to a depth of 27 feet since the time of Mœris, or about 2200 years before our era. As some of the assumptions upon which this opinion is based appear to have been admitted too hastily, and the problem of such an abrasion being one of interest, the whole is about to undergo a strict scrutiny, at the suggestion of Mr. Leonard Horner, F.R.S. The moderate velocity of the stream, and the hardness of its siliceous-sandstone bed, certainly render such an abrading power a startling hypothesis; still there is ground for thinking that extraordinary changes are in operation in those regions. I mentioned last year that M. Rochet d'Héricourt believes the soil of the Arabian Gulf and of Abyssinia to be in a constant process of elevation, which, considering the vast number of hot springs he met with, and the abundance of active or extinct volcanoes, he attributes to volcanic action: and he assigns the ruin of Adulis on the Red Sea, not that near Báb-el-Mandeb, to the rising of the ground.

The geodetical and topographical details of Algeria are advancing; and the Minister of War in Paris, wishing to hasten them, has given permission to Captain Galinier to connect the whole operations of the several provinces, particularly the trigonometrical work of Captain Morel between Oran and Algiers. Mons. Bargès had made a tour to

Tilímsán, and from thence to Sebdú, on the borders of Morocco, and to the Algerian Sahrá; but the part of his journal which has been made public points out little that is new. Indeed our chief expectation of discoveries in those quarters is derived from the expedition to Central Africa which left Tripoli last year under the direction of Dr. Barth and Mr. Richardson; of the progress of which, through the kindness of the Chevalier Bunsen, Dr. Beke, and Mr. Petermann, we have had the satisfaction of hearing. It seems that they crossed the Great Desert, and arrived on the frontiers of the kingdom of Aïr or Asben, where they encountered considerable hostility from the natives. Matters, however, had been amicably arranged by the powerful Prince En-Nūr; so that at the date of Dr. Overweg's last letter to the Chevalier Bunsen (*27th of October*, 1850) the expedition intended to start for the south in a few days, and we hourly expect news of their having reached the borders of Lake Tchad. The travellers had collected much valuable information relative to the resources, surface, geology, and natural history of the countries they passed through; and from the excellence of their instruments and their skill in using them, determinations of latitudes and longitudes to a considerable degree of accuracy may be expected.

Although but little of a decided geographical import may have been reaped in Western Africa which has reached us in the past year, our acquaintance with it is ever on the increase. Lieutenant Duburquois wrote an account to Captain Bouët-Villaumez, Commandant of the French naval division there, of his exploration of the river Tendo or Tanóe, accompanied by a map constructed by himself. M. Duburquois repeated and verified the former observations on the great lake Ahy, to which I last year alluded; and proceeded up the river for 40 leagues, when he was obliged to return, as the water was daily diminishing from dry weather. Our moral information respecting the benighted slave nations has also been increased by a book on Dahomey and the Dahomyans, the author of which is Commander Frederick Forbes of the Royal Navy, a Fellow of this Society, who accompanied the zealous Mr. Duncan to Abomey, and who has studied the languages of the coast with considerable effect.

The perseverance of our travellers is opening to us new fields of knowledge in South Africa, where the Rev. Mr. Livingston has announced the existence of another large lake within 200 miles to the north-westward of Lake Ngami. These two sheets of water are connected by a rapid stream called the Teoge; and the new lake is said to contain some large islands, upon one of which the well-known chief

Sebetoane resides. Mr. Frank Galton, F.R.G.S., as you may remember, left us last year with the intention of proceeding to Lake Ngami, but certain political aspects—discontented Boers being then in possession of the country north of the Vaal River—induced him to sail for Walvisch Bay in a small schooner, by which he would so far avoid many difficulties at the outset of his undertaking. Besides his friend Mr. Andeson, he was accompanied by seven able servants; and on landing he intended to proceed to the missionary stations, and from thence to penetrate to a Lake Demboa, reported to surpass the Ngami in extent. Considerable apprehension was entertained that this intention would be marred by the state of the country at that moment; but my friend Mr. Maclear, the Astronomer Royal at the Cape, in a letter of last February, says—"You will receive by this post an account of that notorious Namaqua plunderer, Jonker Afrikanda, and his performances in the direction of Galton's track. But Mr. Haddy, the Wesleyan Missionary, who was lately with Jonker, assures me that Galton need have no apprehension on that score. But he thinks it probable that the tribes between Jonker and the Lake will be suspicious of all visitors. On the other hand, Mr. Hahn, the Rhenish Missionary, upon whom the traveller intended to call, is an active, enterprising man, and will undoubtedly offer his company to the Lake. I know Hahn personally, and I believe his knowledge of the native languages there, together with his imposing personal appearance—almost a Bruce—and experience of various tribes, will provide a complete frank on the path. The present unforeseen Kafir war will probably not be even heard of in the Dammara country; deserts, rebel Boers, and quarrelling tribes intervene. Such people know little beyond their own *worlds*, and care but little for that which does not immediately concern them."

Since this letter of Mr. Maclear's, Mr. Arrowsmith has communicated one from Mr. Alfred Dolman, the companion of Mr. Gassiot jun., which, under date of April 8th, announces the failure of their expedition into the Namaquas' districts, "and that too," he says, "by our own fault, in too readily listening to the interested advice of certain parties." It seems that, in pursuance of the reliance placed on the counsel thus given, the party landed at Angra Pequena, and made their way to Bethany.—"We did not wish to go to that desolate place," writes Mr. Dolman, "but the native chiefs deceived us, and just guided us wherever they chose. Despite the praises of the missionaries, I must say that the Namaquas are the greatest liars and ruffians I ever met with." Disgusted with their intercourse, and distressed by a scarcity of food and fodder, our travellers began their return march through a burnt-up desert: they encountered much hardship from want of water, and reached Kamaggas, on the borders of Clanwilliam, with the loss of 19 oxen, 3 horses, and 10 dogs on the road. Nothing daunted, these gentlemen were about to start into the interior, to reach the Limpopo.

An account of the Dammara country has been drawn up by Mr. F. W. Kolbe, a Rhenish missionary, by which it appears that there is a practical route to the Lake from Walvisch Bay, and that Elberfeld, the farthest of the stations, is only 300 miles from Lake Demboa. It also appears that the missionaries of the Dammara communicate with Cape Town by way of Angra Pequena, which, though rather more distant from their stations than Walvisch Bay, is found to be the easier route, both on account of the country's being less sandy, and the communication with Table Bay by sea more easy. The rainy season in these districts commences in October, and lasts till March or April: the climate during the remaining months is very agreeable, being clear and bracing, though piercingly cold in the night. The country abounds in wild beasts;—lions, leopards, rhinoceroses, hyænas, buffalos, giraffes, zebras, gnus, and many kinds of antelopes, are found in great numbers.

The Dammaras are a numerous people, and of the Kafir race. Messrs. Galton and Oswell have instructions from Sir Harry Smith to communicate with the native chiefs near the Lake, and to endeavour to induce them to establish friendly relations with the Colonial Government, for the purpose of trade and discovery.

The bishop of the colony had returned from an anxious and laborious visitation tour through the whole extent of his diocese (800 *miles east and west*), as well as Kafraria Proper. His Lordship left Cape Town on the 1st of April, 1850, and was nearly nine months absent, during which his journeyings exceeded 4000 miles, in districts only passable in a cart, on horseback, or on foot. His journal is full of interest, and will probably be published in the course of the next month.

The east coast of Africa may be deemed to be in steady advance, and destined for a more regular commercial communication with the rest of the world than has been practicable for many ages; and much of the geographical confusion in that region is likely ere long to be removed through the agency of the missionaries. Thus, among the African journeys, none can be of higher interest to the inquirer than those of Messrs. Rebmann and Krapf, from Mombas into Jagga, Taturu, Wakamba, and other districts which must be recognised as part of the

Uniamési, or Country of the Moon. These intelligent and persevering missionaries were rewarded with the discovery of Kilimandja-aro, and, since I last addressed you, with Kenia, another stupendous eminence covered with eternal snows. Now, though Ptolemy's data—grounded on Herodotus, Marinus Tyrius, and the reports of merchants and travellers—cannot be greatly relied upon, these elevated ranges appear to be in the vicinity of the spot where the source of the Bahr al Abyad, or White Nile, will be found. The table-land of eastern Africa, instead of consisting, as was generally supposed, of a succession of plateaux, or terraces rising above one another from the shores of the Red Sea, is found to be an elevated region of irregular surface, abrupt towards the Indian Ocean, but shelving down gradually towards the Valley of the Nile.

From inquiries which I diligently made in North Africa many years ago—some of which, bearing on the great western arm, or Nile of Herodotus, were published in the Quarterly Review for January, 1818—I am, of course, very strongly interested in the question. And these were the inquiries which, together with the results of my own journey to Ghirrzah, in 1816, induced our Government to send out an expedition to explore Africa from its northern frontier. From these circumstances, and a study of nearly all which has been written on the subject, I have certainly formed a decided opinion respecting the geography of these regions. I shall not here allude to the controversial disputes which have so greatly mystified the rise and course of that wonderful river the Nile; but must unhesitatingly express my own conviction that NO EUROPEAN TRAVELLER, FROM BRUCE DOWNWARDS, HAS YET SEEN ITS TRUE SOURCE. It still remains an important geographical problem, one which will never be satisfactorily solved till successive explorations have shown which is the main stream that gave birth to that mighty river. Till then we must still say—"*Ignotum, plus notus, Nile, per ortum.*"

AMERICA.

Notwithstanding that our acquaintance with America is barely of 360 years' standing, the boundless speculations of commerce, the successful labours of intelligent travellers, and the truly British energy of the Anglo-American population, have made every portion of the New World better known in that comparatively short period, than large tracts in the Eastern Hemisphere. But we are now proceeding from a general to a particular knowledge, and the surveys of the British possessions are gradually advancing. During the past year several sheets of the labours of Capt. Bayfield and his assistants, already mentioned to you, have been published by the Admiralty; including Buctouche River, Mabou Harbour, Crapaud Roads, Campobello Island, and the 9th sheet of the Gulf of St. Lawrence.

Nor has the diligence of the Americans, to which I alluded in my last Address, slackened. The coast survey has been steadily carried on, under organized parties divided into eleven sections, or rather stations; who push forward the field-work and hydrography simultaneously; and the observations for differences of longitude by the electrical telegraph, are advancing under the assiduous care of Mr. Sears Walker. Numerous sheets have been published within the year, and the first part of the Chronometric Expedition to determine the difference of longitude between the United States and Great Britain, has been brought to a close: the second series of those observations is in hand. The very able and detailed Report of this grand survey, by Professor A. D. Bache, its superintendent, was forwarded to your library by the kindness of the Hon. E. Everett, and is in every respect a model for works of that kind. Mr. Everett also had the kindness to send me the elaborate Chart of the Trade Winds of the Atlantic Ocean, together with the investigation of the winds and currents of the sea, by Lieut. Maury, of the United States Navy, and Superintendent of the National Observatory at Washington. Nor has his courtesy stopped here—for I received the recent survey of the California and Oregon coasts, just completed by Lieut. M'Arthur; "who, poor fellow (he adds), has not lived to enjoy the credit of his work, but died the other day at Panamá, while on his return home. This arduous work was undertaken and accomplished by M'Arthur under exceedingly trying circumstances. He arrived in California with a small vessel during the worst phase of the gold fever. His crew revolted and deserted; and on one occasion pitched an officer into the sea, who by the merest miracle drifted to the shore, and was restored to life. The mutineers were pursued, captured, and hung; but while pushing his labours, the active commander had been obliged to manacle his men to their boats."

Capt. Ringgold, of the American Navy, is now preparing a series of maps of high interest: they comprise the bay and harbour of San Francisco, with the Farellones, the bay of San Pablo, and the Strait of Carquials. There has also been an expedition to explore the Rio Grande del Norte; but it was found that, though that river has plenty of water, it is so much interrupted by rapids that unless some of the rocks are cleared away it must remain unnavigable even for steamers: the adjacent country is represented as being of astonishing fertility. Utah, the new territory inhabited by the Mormons, has also been partially examined. Its physical situation is described as very curious —surrounded on all sides by frightful rocks covered with snow or saline efflorescences; the vast basin in which they have placed their city is fertile, healthy, and estimated to be capable of readily supporting a million of people: it is about 560 miles in diameter, and elevated 4000 or 5000 feet above the sea. Capt. Stansbury, of the Topographical Engineer Corps, had made a survey of that singular sheet of water the Great Salt Lake, and pronounces that the accounts of it had been exaggerated. "That it has no outlet," he says, "is now demonstrated beyond doubt: and I am convinced, from what I have seen, that neither the river Utah (Jordan of the Mormons) nor the lake can be of the slightest utility to commercial navigation."

The late movements have seriously invaded the property and "vested" rights of the Red Man, who must ere long succumb to his fate. Mr. Catlin, the well-known traveller and historian of the North American Indians, and whose recent plan for the institution of a *Museum of Mankind* has met with the approbation of many influential members of the Geographical and Ethnological Societies, has prepared and laid before the latter an exciting paper on the physical peculiarities and peculiar customs of the *Mandans*, a recently extinguished tribe of the Red race. In this valuable communication he has laid open the strange religious ceremonies of that tribe, with all its connecting links, many of which it was necessary to omit in the published accounts. He has also advanced his own reasons, founded on certain striking resemblances in customs and language, for believing that the Mandans were an admixture of an original American stock with some colony of Welsh; and this he is disposed to attribute to the expedition which sailed from North Wales, under the command of Prince Madoc's brother, in the fourteenth century.

Much attention has been paid in America towards impinging upon time and space, as respects the communication between the Old and the New Worlds; and especially as to shortening the time of passage between New York and London. The most received project is founded on the fact that railroads are three times as expeditious as steamers; consequently, instead of embarking at New York, it is proposed that passengers should proceed by land as far eastward as a railroad can be carried—that is, to the utmost verge of Nova Scotia—and there embark. They then should make the best of their way to Galway Bay, and take to the railway for Dublin. Now, after what has been achieved in international communication of late, we may reasonably hope for further improvements. A voyage to the East Indies and back in former times occupied a couple of years, or more; ordinary merchantmen can now manage the same in nine months. In 1750, a time when the trade winds were pretty well understood, three fine Indiamen—the 'Ilchester,' 'Anson,' and 'Shaftesbury'—sailed from the Downs on the 5th of April, and arrived at Bombay in September: in 1850 the same voyage is averaged to occupy 75 days, and news is carried by the overland mail in less than a month. This is owing to a proper application of science and experience; and I cannot but augur that Lieut. Maury's inquiries—as shown in the charts I mentioned—will still further abridge our longest oceanic voyages.

Perhaps I ought not to allude to Lieut. Maury's most useful labours from this chair, without at the same time expressing an opinion upon so remarkable an application of the laws of atmospheric movements to the purposes of accelerated navigation. Without detaining you with an enumeration of the indistinct notions hitherto entertained respecting the winds, I will at once say, it is but lately that the subject has been so scrutinized as to render it not improbable that the constant succession of cause and effect may at length be ascertained; and undoubtedly, the nearer we approach that important subject, the larger and more comprehensive will be our views. The inquiries of Capper, Redfield, Reid, Dove, Thom, and Piddington, recorded more accurately than before the laws of atmospheric phenomena, but left the theory of them almost untouched. The next stride towards the development is advanced by the Wind and Current Charts constructed by Lieut. Maury, from all the accessible log-books of American ships—the direction and strength of the wind as observed daily, compared with the track of the ship, and distinguishing the variations at different seasons of the year, and other essential data not previously collected. In this laborious work it were much to be desired, that the observations noticed had been a little more accurate; that some instrumental method had been employed in determining the exact character of the apparent wind, and that this had been corrected for the motion of the vessel. The introduction of a marine anemometer,* and a more accurate scheme of registry, would refer such observations to exact ideas of number and measure, the only inductive road to truthful utility. But, with all my admiration of Lieut. Maury's line of investigation, I cannot consider him as happy in supposing magnetism to be one of the most powerful agents of causation; in this he will perhaps find that he is leaning on a broken reed.

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* My son, the present Astronomer Royal for Scotland, in conjunction with Captain Cockburn, R.N., has had such a machine made; and his attempt to improve the present methods of determining the strength and direction of the winds at sea will be found in Vol. XVI. of the Transactions of the Edinburgh Royal Society.

Another intelligent officer of the American Navy, Lieut. Charles Henry Davis, with whom I have had the pleasure of being in correspondence, has directed his attention to the duties intrusted to him with a philosophic mind. So long ago as September, 1848, he wrote—"I have recently arrived at some interesting conclusions concerning the connection between the tides and other currents and the alluvial deposits in the depths and on the borders of the ocean; and my views bear out the theory that attributes the principal changes in the condition of the earth's surface to causes now in operation. I am able, I believe, to show a permanent and natural relation between the local and general tides on the one hand, and the eastern border of the United States on the other; between the shores of the Gulf of Mexico and the currents by which they are washed. The sandy deposits on the Atlantic border are remarkable in outline as well as in quantity. A narrow strip on the coasts of Florida and Georgia spreads out into those prominent capes and enormous banks and shoals which give such a peculiar character to our navigation. On the shores of Europe the vast deposits of similar material at the bottom of the Bay of Biscay, and in the North Sea, are to be traced to the same laws of tidal action. The theory will also account for similar deposits elsewhere, and for the banks and shoals composed of the coralline detritus in the Indian Seas." Since this was written, Lieutenant Davis has given the American Academy his views on what may be termed Tidal Geology, and the consequent formation of shoals, banks, bars, beaches, hooks, and sea-walls; and he has succeeded in tracing the effects of great causes through all their mysterious phases, with the cautious observation and inductive experiment which science demands.

From the more central parts of America we have received notices of a local character—as, for instance, the ascent of Popocatepetl, near Mexico, by Mr. Edward Thornton, which was read to you in March. This was once esteemed a formidable feat; but, though demanding energy and physical endurance, it is now shown to be an undertaking of no very extraordinary difficulty, since there is established in the crater itself an organized company of adventurers, who daily work therein, extracting sulphur for sale in Mexico.

A letter has been received from Sir Robert Schomburgk, at St.

Domingo, regretting that political occurrences had confined him to the neighbourhood of that city. He had, however, succeeded in making some chronometric measurements, and becoming acquainted with many of the physical features of the country, which, when complete, he hopes will be sent by Lord Palmerston to that Society which patronized his first geographical aspirations, and whose child he considers himself to be.

A communication was made to us on the Island of Ruatan, in the Bay of Honduras, by Commander R. C. Mitchell, of H.M.S. 'Sappho,' the principal feature of which is the account of the present inhabitants of that place. But the neighbourhood reminds me of an excellent little publication by Mr. O'Gorman, one of your Council, on a subject of high import. It is intituled 'The Mahogany Tree,' and treats of the botanical characters, qualities and uses, and other particulars of that most valuable timber; with practical suggestions for selecting and cutting it in Central America, and other regions of which it is a native. The book is illustrated with engravings, and accompanied by an explanatory map on a large scale, showing the mahogany districts, and other fine forest-tree countries. This was drawn up by another of our members, Mr. Trelawny Saunders, and merits notice for its accuracy.

An American traveller has sent an account to the Geographical Society at Paris, of his meeting with M. Bonpland, Humboldt's celebrated companion, near San Borja, where he lives happily with his family, constantly making additions to his Herbarium, which he considers as belonging to France, and which contains at least 3000 plants; the collecting of it seems to have obliterated the bitterness of his forced detention by Dr. Francia.

A paper of great interest was read, on 'The Geography of Southern Peru,' by Mr. William Bollaert, a Fellow of this Society, to whom our Journal had been previously indebted. He described a part of the country less known to Europeans than the rest of the province. Leaving Arequipa, at the foot of its snow-clad volcano, he passed desert plains with their vast tracts of moving hemispherical sand-hills (*medanos*), which have been known to overwhelm the traveller under their shifting masses. The district of Tarapaca—with its rocky mountains, its desert steppes, and its mines of silver—was next examined; and Mr. Bollaert believed that the huge range of Lirima, in the Cordillera Real, will, upon further investigation, prove to be the culminating point of the New World.

The anxiety to which I last year alluded, respecting an equatorial channel of communication between the Atlantic and Pacific Oceans, appears to be on the increase in America; and has been the occasion of such animated discussion among ourselves, that the interest taken by the Society in so great a question cannot be misunderstood. There can be little doubt that the time has arrived when this gigantic task will be commenced; and the place to be chosen for the purpose of ensuring success, must lie somewhere between the 4th and 13th degrees of North latitude. But, as before observed, there are several sites for lines in that interval, each of which are strongly but not dispassionately recommended by the respective parties; and it is somewhat of a tax on the judgment whether to side with this or that projector, this or that engineer, or even with the committee on naval affairs on the other side of the Atlantic, who made an official report to Congress on the subject. Such was the state of our information, when the excellent summary drawn up and read by Captain Robert Fitz-Roy, of the Royal Navy, at the suggestion of Dr. Norton Shaw your Secretary, came before you, forming a considerate, searching, and matter-of-fact examination of each of the plans proposed. This chain of argument on the Great Isthmus, illustrated by a very carefully executed map by Mr. Arrowsmith, is now published in your Journal; but the topic demands a few more words, since public attention has been so strongly turned to it, not only on account of political and commercial considerations, but also because of the higher interests it possesses. Struck with the advantages likely to accrue to navigation, trade, and civilization by so grand an effort, M. Jomard says it pertains "à la science géographique la gloire d'avoir préparé cette révolution!"

Captain Fitz-Roy assumes that "the *principal* object in view is a navigable channel between the two oceans, through which the largest ships may pass without breaking bulk or being lightened; the *least* object contemplated is a common waggon-road." Remarks follow on the existing methods of conveyance across Central America; on health in that climate; on storms; on volcanic action; on the resident Indians; and on political obstacles. A few diminished tribes of independent Aborigines still inhabit the mountainous ranges, and oppose the access of travellers. The political instability of the local governments is insisted on as a material obstacle in the way of executing great works in Central America; and great stress is laid on the urgent necessity of having adequate harbourage at each extremity of any canal or railroad that may be constructed. "Another momentous consideration must not be forgotten, which is, that the larger and better the canal, or other means of intercourse (*cæteris paribus*), may be, the greater will be the world-at-large profit; while, on the other hand, the smaller the scale of the work effected, the more exclusively local must it become in value."

The four principal and several secondary lines were proposed and discussed, and I think their peculiar features were impartially stated; but Captain Fitz-Roy makes a general summary, showing that only one line, namely, "The Cupica and Atrato route, appears now to offer a reasonable prospect of encouragement to undertake the construction of a ship-canal; and that only one other route, from Porto Bello or Manzanilla to Panamá, seems likely to become the site of a great permanent road for traffic, if not for a railway."

Such is the state of the case as it now appears before us; there can, however, be no doubt that, notwithstanding the labours of many intelligent surveyors and travellers, we are still in want of more precise local knowledge, and the suggestions of experience. It is therefore an undertaking which can only be executed efficiently under the patronage of government, not by the limited means of an individual association: no public minister, nor any speculative capitalist, will now act on the reports of moderately-qualified and irresponsible examiners.

This magnificent scheme has, however, met with an opposition from Mr. Asa Whitney, the projector of a gigantic railway for connecting the Atlantic and Pacific Oceans, thereby approximating what he terms the great centres of the populations of Europe and Asia. While the easternmost point of departure in America should commence at Halifax or New York, Mr. Whitney proposes that a belt of territory 60 miles wide—30 miles on each side of the road—with its eastern base on Lake Michigan, and its western on the Pacific, a length of 2000 miles, comprehending about 78,000,000 of acres, shall be appropriated to this object. The capital wherewith to construct this road, Mr. Whitney proposes to create by the increased value imparted to the lands thus consigned, and reclaimed from the wilderness, by the construction of so grand a railroad, with its commercial agencies and electric telegraph. Besides the startling nature of the project as regards the enormous tract of country intended to be crossed, the originality of carrying out so vast an undertaking, not by the usual method of loans, but by the positive creation of capital, must strike every one; and so strongly is the projector imbued with the prospect of entire success (and he appears to command all the bearings of the case), that he feels confident that were his road made, and the Isthmus of Panamá washed away, so as to leave an open passage for fleets, the former would have to bear the whole commerce of the globe. The arguments *pro et con* are now under agitation; but through all a characteristic instance is given of the Anglo-American propensity to be "doing."

CONCLUDING REMARKS.

Having thus shown the principal features of the geographical undertakings of the last year in detail, I trust you will allow me to embrace the occasion which now offers of delivering an opinion or two respecting our own duties. In so doing let it be borne in mind that things, and not persons, are the objects of my remarks; and not a word must be misinterpreted into a disparagement of the devoted and fatiguing exertions of travellers, or an attempt to discourage their views and labours.

In the recent and vast strides which knowledge has been taking, a strong proof is afforded that by the active labours of the mind the supremacy of man is maintained, his wants ministered to, and the amenities of his life increased. Hence the numerous conventional methods adopted for the enjoyment, diffusion, and promotion of information, as clubs, reading-rooms, public libraries, and societies. The three first are fast becoming essentially necessary to the social existence of civilized life, and are therefore open to all members of community, even to those of the merest rudimental education. But Societies are particular associations for the furtherance of some selected branch of science or knowledge, in order to promote the cultivation of it by bringing together those who are interested in such pursuits. The components of such bodies are to be considered of a higher intellectual training than is necessary for a mere reading-room,—since it is the advance of a science, and not the lighter personal requirements, which ought to be their ruling passion; hence the necessity of qualifications so strictly demanded by most incorporations, with every testimonial for the admission of a new member.

In a prospectus which I drew up, printed, and circulated just before the first establishment of the present Society, the ends and objects of such an association were stated; and on a recent reference to that document I find that my opinions remain unshaken. The principles of the argument were congregation, co-operation, and the establishment of a safe deposit in which the contributions of the whole geographical world might be received, preserved, and rendered easily available to every inquirer: and while the utmost encouragement was held out for the convenience of members, the promotion of travels, and the tendering of aid to the merest tourists, the fuller nature and conclusions of your enrolment were thus pointed out:—

- Geography
  - Absolute
    - Of the mass and form of the globe.
    - Motions and intrinsic properties of the globe.
    - Of effects from celestial causes.
  - Physical
    - Natural divisions and geological features of the world.
    - Mountains, plains, deserts, mines, and minerals.
    - Particulars of the animal and vegetable kingdoms.
    - Seas, lakes, rivers, and springs.
    - Currents, tides, hydrographical data.
    - Climate, winds, weather, and seasons.
    - Volcanoes, earthquakes, and other phenomena.
  - Special
    - Ancient and modern history of the earth.
    - The distribution of races and languages.
    - Names, derivations, and revolutions of states and cities.
    - Latitudes and longitudes, astronomical and geodesical.
    - The variation, dip, and other magnetic phenomena.
    - Determination of heights and distances.
    - Relative magnitudes of all countries and nations.
  - Political
    - Population, division of the people, general statistics.
    - Artificial divisions of lands, agriculture, produce.
    - Commerce, manufactures, fisheries.
    - Government, manners, customs, laws, policy.
    - Canals, roads, mills, bridges, markets.
    - Religion, education, forces, arts.

Now we have principally exerted ourselves, and I am happy to say with beneficial effect, on the two latter divisions of this scheme, while a world of work still remains almost *in statu quo* in the first, and comparatively little has been done in the second. I might be here told that the art of pointing out the principles of correct geography, and the art of correcting elemental geography itself, may often be two things widely differing *in genere;* but I well know the value and advantages of theory and practice rowing together. It is under this persuasion that I venture to point out the necessity of introducing greater exactness, more philosophical method, and more numerical precision, into all observations, instead of what was little better than mere guess work. From the unwearied pains of intelligent travellers we have a large insight into the animate and inanimate relations of foreign countries, into the soil and geology, the face and produce of the surface, and what lies beneath it; the rivers, lakes, mountains, climate, and the natural history strictly so called: particulars which their talents, and the acquisition of modern languages, have enabled them to obtain. This, however, is not enough to form the staple of a Society's care. Something higher is imperatively necessary to enable us to advance; but in begging your sufferance for a few minutes longer I shall adhere to the practical branches of our duty, without venturing to soar into the Empyrean regions of the higher sciences.

The preceding details of what has been accomplished in various parts of the world during the past year may surely be regarded as very encouraging; and although no very notable or striking discovery may have been made, it is abundantly shown that the men of the present day want neither the fervour of spirit, the power of mind, nor the vigour of body which have distinguished the leaders of past ages. It is to be remembered, too, that any really great discoveries are neither made, distinguished, nor recognised in a moment. We no longer hear now, as of erst, of new continents having been found, or new oceans explored: these are no more the days of that almost romantic epoch which forms the great landmark in the history of geographical progress, when every voyager was able to take possession of vast territories in his own or his country's name. We now know tolerably well the size of the world, the extent of sea and land, the forms and characteristics of each portion; and if in the middle of some inhospitable continent there still exist any tracts unknown to us, they are comparatively unimportant in the economy of the whole globe. And every post brings us news of still further advances made even in such tracts; so that if we cannot yet say decidedly that there are no blanks in the map of the earth, no long period will elapse before that can be affirmed. One by one the last remnants of the unknown will yield to the efforts now made: but had we even actually arrived at so desirable a consummation, would our labours then be terminated? Would geographical societies cease to be requisite?

Certainly not. Our work might then be said to be only beginning. Till we actually know the whole extent and surface of the globe on which we move, its peculiarities as a whole, and the mutual relations of its separate parts, it can never be thoroughly investigated or understood; and much may long remain, as it is now, only a source of wonder and confusion. Those who have not overlooked causes and their necessary consequences, will entertain no distrust of the future. To accommodate ourselves to a different state of requirements, and keep our Society in the van of its votaries, it is only necessary to look out ahead. Among other matters, more congenial appreciation must be shown for sciences which commonly have been looked on as diverse from geography, but which, though apparently standing on a different course, are really all tending to the same end. We must, in fact, look upon everything in a larger point of view than before—not in parts, but as a whole—and then we shall find new worlds of mind and matter awaiting new Alexanders to conquer them. Whether studying the superficies of the earth, or investigating its peculiar properties as regulated by organic forces and cosmical dynamics, ours is, in every way, a progressive science of observation; and one which, by lifting us out of that cheerless philosophy which regards not a material creation, advances the high intelligence of our nature.

It is therefore evident that, in the present stage, all possible precision and accuracy in his observations is more than ever indispensably necessary, if the traveller wishes them to be of any real value; nothing should be left to the mere testimony of the senses, and actual admeasurement, where practicable, should never be omitted. As astronomical determinations are indispensable for fixing the positive and relative positions of places in our maps, no traveller should neglect to acquire the habit of using such means of ascertaining the latitude and longitude of any place not previously visited, as in the present state of science can readily be acquired. The improved form of the Nautical Almanac, of instruments, of observation, and of reduction, render these determinations so easy, that those are now inexcusable who fail to perform better what was so often tolerably done under the greatest disadvantages. When we speak of modern maps as very great improvements on those of the last century, we are apt to forget how few of them rest on any certain data, how rare are the cases where actual surveys have been made, and of how very late a date are the triangulations upon which alone a truly correct map must depend for accuracy. It but too frequently happens, that the most careful combination of imperfect materials leads to the continuation of error instead of the establishment of truth; of this a better proof cannot be adduced than the maps of that indefatigable and able geographer, the late Major Rennell, once so highly esteemed, now so completely superseded. These considerations should induce future travellers to fix their attention exclusively on such observations as lead to certain and ready results, not such as can only be verified in distant times and places. In all widely extended countries the astronomical data should alone be used, and so used that the probable error of each result may be stated. Differential methods—mostly so captivating by their easiness, but which are liable to increase in unknown deviation from truth the further they go—are to be carefully avoided, except when they can be adopted with some wholesome check on their vagaries.

I should here remark that, while advocating the best obtainable results, I am not insisting on perfection: the idea of absolute accuracy in anything is totally discarded by all truly scientific men; and no *ipse dixit* from any one—however able and however honourable—produces conviction. Let no one, therefore, delude himself that his instrument can be perfect; be it what it may, it must have errors of construction, and perhaps errors of principle too. The nature and amount of such irregularities should be carefully detected and minutely recorded; for even though they may be too small to produce any sensible effect on the numerical reductions, they should nevertheless be stated, as necessary to furnish a clue regarding both the observer and the instrument.

The importance of these considerations will be evident, on recollecting that the general principle of geodetic surveying consists in the measurement of the various angles of a net-work of triangles spread over the surface of the country to be examined, and the determination of the magnitude of their sides in reference to one or more accurately measured bases. The position of these triangles is then to be resolved in relation to the meridian, and parallels of latitude, of the terrestrial spheroid. At a casual glance it might appear that such a process was one of no great complexity, and within the reach of persons of moderate acquirements; this, however, would be a very mistaken opinion, for every error of measurement or observation, every fault of calculation, and every omission of circumstances, is multiplied and increased as the survey extends; hence the absolute necessity of intelligence, activity, and science well applied, in the conduct of national surveys.

This is hardly the place to enter into the requisite instrumental and practical details, or I would proceed to point out the best sort of instruments for geographical travellers in various parts of the earth, according to the degree of magnitude or accuracy they might wish to attain; but I cannot help observing that this is a point wherein there is still room for improvement. For hasty travellers the self-same methods as are used at sea have been too immediately recommended, without considering the change not only of instruments, but also of objects of observation, required by the alteration of circumstances; while for others enjoying more leisure, and professing to aim at greater accuracy, the *tools* have often been of a description rather fitted for exhibition in the maker's shop than for actual work in the field. Fortunately for us, scientific men are rather eager than otherwise in lending their aid on these occasions, if they perceive a chance of their ideas being carried into effect; and if geographers and travellers will but show a greater desire than hitherto to go to work effectually, they may rest assured of receiving every aid.

And here I should remark, that even those useful marine instruments the quadrant and sextant, admirable as they certainly are, still admit of improvement for naval purposes. It is well enough for the commercial and motive powers of navigation to observe only the sun and moon, but for the wants of geography circles should be used instead of sextants, and stars in place of the sun; and in adapting the subjects of observation at sea to geographical purposes on land, it must be remembered, that while observations of altitude afloat are capable of less accuracy than any other, it is quite the contrary on shore: so that, although longitude by lunar distances is the great cynosure of navigators, travellers by land have no need of them; their better way is to obtain the longitude by determining the right-ascension of the moon through altitudes off the meridian, or its declination by the same method when culminating: this will be found more easy, and probably more accurate than the others; but for those travellers who cannot acquire dexterity in the use of reflecting instruments, and whose means permit the use of larger apparatus, the recent improvements of the alt-azimuth circle are important. It may even yet be made much firmer, stiffer, and more simple and accurate: it should, while serving to obtain an approximation to the measure of horizontal angles, be unimpeachable in its altitudes, and as firmly fixable in the meridian as a transit telescope.

Whatever the instrument, however, or whatever the phenomena observed, my intention is to point out the direction in which the higher exertions of geographers are most required; and it might follow, that, while enriching our numerical and logical accuracy in these departments, they will also acquire more enlarged and philosophical views of the whole grand and inexhaustible subject. With the powerful means which may now be obtained, and in the true spirit recommended, travellers may hope not only to enlarge the boundaries of our geographical knowledge, but also to assist in reaching some of the most important generalizations and grandest discoveries that have ever, either in their consequences added to the material comfort of man, or so enlarged the compass of his views as to make him more worthy of his place among created beings: such are the points at which we should aim; and with such objects constantly in view, our Society will obtain and merit the esteem of posterity as well as the approbation of contemporaries.

It is now my duty to take a final leave of the station with which you have honoured me; and on resigning the post I cannot but esteem myself fortunate in having, with the aid of a zealous Council, been able to carry out some of those plans and purposes for the advancement of our best interests, the accomplishment of which I had sincerely at heart when I ventured to undertake so responsible a charge. This satisfaction is still more enhanced when I look to my able and experienced friend Sir Roderick Impey Murchison, to whom I now resign the Chair; and than whom no one has evinced more regard for your welfare, more interest in your pursuits, or more continued application to every branch of your proceedings. Feeling satisfied, therefore, that nothing will be left undone which may ensure success, I can, with the brightest hopes for the future, emphatically say—FAREWELL!